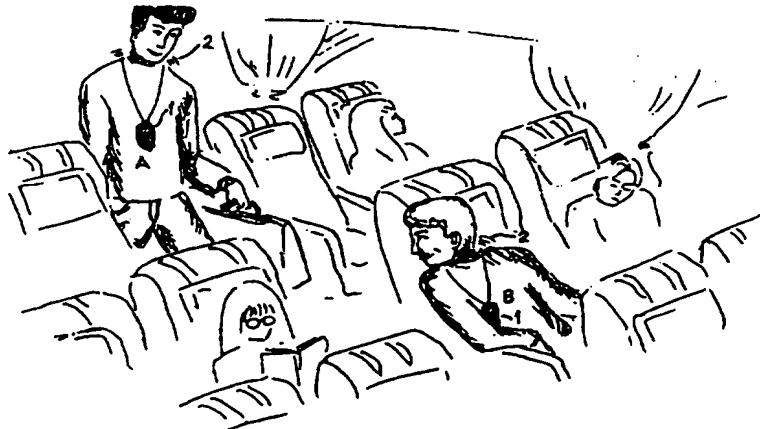




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(54) Title: PERSON IDENTIFIER



(57) Abstract

The object of the present invention is a portable device with which people, who have joined the same community, may identify each other as "Kinsmen". Devices of the invention carried by persons in a certain community transmit, when in search mode (e.g. modulated to a radio wave), the code adopted by the community to close range (e.g. 50m) at intervals (e.g. a couple of times a minute). At intervening times, the devices selectively "listen" whether some device happening to be in the neighbourhood is transmitting the same code. If the device receives and identifies the same code singal, it automatically transmits its code back after a short delay (e.g. half a second), and when the persons happen to come within close range, both their devices start transmitting the code in turns after the said delay, giving their bearers a signal. There is only need for one type of devices which operate both as senders and "listeners" of the code and as signalling devices. After the code is synchronized, any device may cooperate with any other device. The operation principle of the device is so simple, and it can be assembled from so few components, that it is possible to install it to a pendant, badge, wrist watch, or to some other inconspicuous place. The power consumption is so low that the device can operate several months with one charge or a small battery.

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Person identifier

5 The object of the present invention is a portable device described in the introduction of claim 1. With it persons, who have joined the same community, can identify each other as "kinsmen".

10 The identification of persons as friends or enemies has been important since the beginning of time. One example illustrating this need is the use of passwords in a war situation. Technical devices are especially known to have been used in the identification of armoured vehicles and aeroplanes. An example is a radar disclosed in the US patent publication No. 15 5,343,205 with a combined identifier of own vehicles. The own vehicles are equipped with an automatic transmitter which, when observing a signal from an own radar, transmits back a signal on a predetermined frequency, enabling thus the radar of the radar vehicle to separate own vehicles from those of 20 the enemy.

25 Solutions have also been developed for the identification of a moving object; a fixed interrogator transmits an interrogating signal, and answering devices attached to the moving objects automatically transmit a response signal comprising the data needed for the identification. An example of such a device for the identification of a movable object is disclosed in the US patent publication No. 5,247,305.

30 Identifiers are also used to identify staff (US 5,204,670), animals (US 5,028,918), and goods (GB 2,210,536 A). Even the handshaking process used in data communications resembles the solution presented in the present invention.

35 However, none of the prior art identifiers are suitable for solving the problem, which is the object of the present invention. It is the object of the invention to supply people with

a small portable device which can be used to identify a person belonging to the same community or the same group of people wherever in the world, no matter if his/her face were unfamiliar or if he/she were otherwise unknown.

5

The identification is based on the following operation principle. Devices of the present invention carried by persons in a certain community transmit, when in search mode (e.g. modulated to a radio wave), a code adopted by the community to 10 close range (e.g. 50m) at intervals (e.g. a couple of times a minute). At intervening times, the devices selectively "listen" whether a device happening to be in the neighbourhood is transmitting the same code. If the device receives and identifies the same code signal, it automatically transmits 15 back its code after a short delay (e.g. half a second), so that when the persons are at close range, their devices will in turns transmit the code after the said delay. Then the devices switch to identification mode and notify their bearers of the change in the operation mode. Gestures and expressions 20 or agreed signs made with the hand indicate an easy way to notice, who of the people nearby is a "kinsman". The devices now switch to waiting mode, and observe from time to time, whether the other device still is nearby, and after the devices have moved out of range, they switch back to search 25 mode.

The present invention also offers its bearer a possibility to contact persons meeting with a certain selection criterion, when moving among crowds of people. For example, someone may, 30 if he/she so wishes, to look among the crowds for a person speaking the same language, being of similar character, or belonging to the same social class, as long as the manufacturer of the devices or the person maintaining the system has fed a code in accordance with the desired selection criterion 35 to his/her own device. Someone else may again wish to look for his/her own guest among passengers arriving at the airport,

whose face he/she still does not know but with whom he/she has beforehand agreed to use a certain code signal.

It is also possible to code the device to identify a person
5 belonging to another group, who has coded his/her device to identify persons belonging to his/her own group. The devices then transmit the code of its bearers and selectively receive the code of a desired group. For example, a man may look for a woman of a certain type, and a woman for a certain type of a
10 man, and the devices give a signal when the criteria are fulfilled.

Also a "membership code" of several different communities can be coded in the same device; in the search mode, the device alternately transmits various codes, and after receiving the "right" answer, it continues to transmit the said code, until it continues the search alternately with different codes after the other device has moved out of range. The sign given by the device can be coded to notify its user of the community which
15 is in question at the given time. Upon finding a member of the community, the device may switch back to search mode to look for devices carried by members of other communities; in this case, the device is in waiting mode in relation to the code of the device nearby, and in search mode in relation to other
20 codes.
25

It is also characteristic of the device of the present invention that there is only need for a one type of devices which work both as senders of and "listeners" to the code. After the
30 codes are found to be in synchronization, any device may work with any other device, as long as they operate with the same signal form (radio wave, infrared radiation, ultrasound, etc.), and use the same modulation method (frequency modulation, e.g. FSK; phase modulation, e.g. PSK; pulse modulation,
35 e.g. pulse width modulation or pulse position modulation, etc.).

More accurately, the characteristics of the identifier of the present invention are described in claim 1.

Many advantages are obtained by using the device of the present invention. Persons belonging to the same community, etc. may identify each other in a reliable way, which cannot be done with any prior art easily portable device. Compared with other identifiers, the operation principle of the device is so simple, and it can be assembled of so few components, that it can be installed to a pendant, badge, wrist watch, or to some other inconspicuous place. The power consumption is so low that the device can operate several months with one charge or a small battery.

The invention is next described in more detail with reference to the following drawings, in which:

Fig. 1 shows an application according to the present invention in its operation surroundings;

Fig. 2a, 2B and 2C are signal flow diagrams in situations where two devices are in search mode (2a), two devices reach the coverage areas of each other (2b), and switch to identification mode, and two devices in waiting mode;

Fig. 3 shows an electronic realization of the device of the invention, where radiowaves are used to transmit and receive the code signal; and

Fig. 4 shows alternative embodiment examples of a code signal transmitter of the device of the invention, using infrared radiation (4a) and ultrasound (4b).

The embodiment of Fig. 1 is a portable person identifier in form of a pendant 1, which operates on radiowaves, and with one code loaded to it. Such a device may, for example, be used by persons belonging to a Rotary organization, a birdwatchers' association, or some religious community. Fig. 1 presents a typical situation of operation, where two members of an organization happen to be in the same railway coach, and they receive a weak but recognizable series of vibrations to the

area of the back of their necks coming from the ribbon 2 from the devices A and B hanging around their necks. They can confirm their observations by making each other a sign with their fingers agreed upon by the organization.

5

The signal flow diagram of Fig. 2a presents a code signal 3 transmitted by the device A and a signal B received by the device A while being in search mode, and a code signal 5 transmitted and a signal 6 received by the device B which also 10 is in search mode. The code included in the code signal has been described in more detail in the partial enlargement 7. The devices A and B transmit their code signals independently so that a code lasting a few milliseconds is repeated, for example, a couple of times a minute. The probability that the 15 devices would transmit their codes simultaneously several times in succession (thus hindering the operation) is extremely small, and, when necessary, it can be totally eliminated by using random intervals.

20

In Fig. 2b there is shown a situation, in which the devices A and B make contact with each other and are switched to identification mode. The code 8 transmitted by the device A is identified as received signal 9 in the device B. This signal activates the device B to transmit a code 10, for example, after half a second; this code again is received and identified as signal 11 in the device A. This again activates the device A to transmit its code 12 half a second later, and it again is received and identified as signal 13 in the device B. The sequence continues. A detector present in both the devices 25 identifies the sequence, switches on the signals and switches the devices to waiting mode.

30 35

In waiting mode shown in Fig. 2c, the devices A and B independently transmit a code (14 and 15) at intervals of half a minute so that another device being nearby receives information on the presence of the device. During the intervening time, the receivers of the devices are listening, and only

detect the codes 16 and 17 received by them. If the receiver of the device A does not receive a code in a few minutes, the device is automatically switched back to search mode shown in Fig. 2. The same also applies to the device B.

5

Fig. 3 is a block diagram of an electronic realization of the device according to the present invention. A code 18 is fed to the code memory 19. A code transmitter 20 feeds the code 21 to a radio frequency transmitter 22 every time it receives a pulse 24 from the pulse controller 23. The code transmitter 20 feeds the receiver 25 a control pulse 26 lasting the time of the code transmission which shuts off the receiver for the time the transmission lasts. The radio frequency transmitter 22 generates a RF signal modulated on the radio frequency from the code signal 21 in form of a series of pulses. An antenna 28 works both as a transmitter and a receiver.

20 The receiver 25 amplifies the RF signal from the antenna and detects the incoming code back to the series of pulses 29. The code detector 30 compares the code with the one it receives from the code memory 19, and generates a pulse 31, in case the codes are identical. The pulse 31 activates the pulse controller 23 to give the pulse 24 to the code transmitter after the set delay of half a second, and the procedure described 25 above will be repeated.

30 The pulse controller 23 examines the pulses 31, and after receiving e.g. 3 pulses in succession at one second intervals, it feeds the activation pulse 33 to the signalling unit 32, thus making the user notice the sign. Thereafter, the controller 23 transmits activation pulses 24 to the code transmitter 20, for example, at 30 second intervals. If the pulse controller does not receive any pulses 31, say for 5 minutes, 35 it passes on to answer the pulses it has received with a delay of half a second, and the device has resumed its normal search mode.

Above there is shown a simple application of a person identifier. The electronic solution may naturally vary, likewise the transmission form of the signal.

5 One alternative embodiment is achieved by using a signal processor. The timing of signals, the identification of codes, and the various operation modes of the controller are generated programmatically by a signal processor, which leads to an even simpler physical structure. The most optimal realization
10 may, however, be achieved by using an ASIC circuit tailored especially for this embodiment.

15 It is obvious that all the embodiments presented above also require an energy source, which may be a battery, a chargeable accumulator, a solar cell, or some other known source of electricity.

20 Fig. 4 shows alternative embodiments for the transmission and reception of the code signal. Fig. 4a presents a solution where the code signal is transmitted as infrared radiation 35 modulated by an infrared radiator 34, the infrared receiver 36 of the other device intercepting the infrared radiation and detecting the code signal modulated to it in the form of a series of pulses.

25 In Fig. 4b there is shown a solution where the code signal is modulated to ultrasonic pulses 38 by using an ultrasonic sensor 37, and the ultrasonic sensor of the other device receives the pulses and detects the code from the amplified ultrasonic signal in form of a series of pulses.

30 Feasible modulation methods comprise amplitude, frequency and phase modulation methods, FSK and PSK methods included. Of the pulse modulation methods, the pulse width and the pulse position modulation methods are feasible, especially when using infrared light.

Signalling may also be carried out by using alternative principles. Besides mechanical vibration on the skin, according to Fig. 1, the signal may also be given to the user as sound signals, light signals, slight electronic shocks on the skin, or even as scent signals made by small scent charges.

5

The physical structure and the appearance of the present invention may also vary. The device may be installed to a piece of jewellery hanging around the neck, a tie, clothes touching the skin, a watch or the like worn on the wrist, a band wrapped around an arm or a leg, buttons or badges attached to clothes, a pen or the like held in a pocket, a belt, a heel of a shoe, headgear, hair-dresses, a pocket phone, spectacle frames, a hearing aid, or even a ring or an earring.

10

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Claims

1. A device for the identification of persons at close range, comprising a portable housing which has the following components inserted into it:

- 5 - a power source;
- a pulse controller (23), the program of which controls the operation of the device;
- a signal transmitter consisting e.g. of a code transmitter (20), a radio frequency transmitter (22), and an antenna (32);
- 10 - a signal receiver consisting of e.g. an antenna (28), a receiver (25), and a code detector (30);
- a code memory (19), in which one or more digital code words may be stored; and
- a signalling unit (32), which notifies the user of the 15 identification;

characterized in that

- the signal transmitter of the device transmits a code signal (7) comprising a transmission code stored in the code memory (19) and recurring at intervals (e.g. twice a minute) to the 20 nearby surroundings, synchronized by the pulse controller (23), which is here called the search mode;
- the signal receiver of the device selectively detects the signals (11) included in the code and, with the help of the pulse controller (23), activates the signal transmitter to 25 transmit the code again after a short delay (12); when another device equipped with the same code arrives within the range of the signal, the devices start to transmit the code signal to each other at intervals after the said short delay; in this connection, this is called the identification mode;
- 30 - after identifying that two devices transmit a code intermittently to each other, the pulse controller (23) activates the signalling unit (32) to give the users of the device a signal;
- the signal transmitter of the device starts to operate as in 35 the search mode, and the signal receiver selectively detects the signal (17) included in the code, which is here called the waiting mode, and unless the code is received, for example,

within a few minutes, the pulse controller (23) switches the device back to the search mode.

2. A device according to claim 1, **characterized** in that

5 - the signal of the signal transmitter is a radio wave to which the code (7) is modulated with some known modulation method; and that

- the signal receiver is a radio wave receiver which detects the signal with a demodulation method similar to the modulation method of the signal transmitter of the signal.

10

3. A device according to claim 1, **characterized** in that

- the signal transmitter comprises an infrared radiator (34), and the signal is infrared light (35), to which the code is modulated with a known modulation method; and that

15 - the signal receiver comprises an infrared detector (36), which detects the signal with a demodulation method similar to the modulation method of the signal transmitter of the signal.

20 4. A device according to claim 1, **characterized** in that

- the signal transmitter comprises an ultrasonic sensor (37), the signal being ultrasound (38) to which the code is modulated with some known modulation method; and that

25 - the signal receiver is an ultrasonic receiver which detects the signal with a demodulation method similar to the modulation method of the signal transmitter of the signal.

5. A device according to one of the claims 1 - 4, **characterized** in that

30 - the code memory (19) includes several codes which the pulse controller (23) and the signal transmitter alternately transmit to their surroundings;

35 - the signal receiver detects the codes, and after detecting a code in the code memory (19), the device switches to the identification mode to transmit and receive the said code; and

- the pulse controller (23) controls the signalling unit (32) to make a signal corresponding to the code detected for the user so that the user can conclude which code is in question.

5 6. A device according to one of the claims 1 - 4, **characterized** in that

- separate transmission and reception codes are stored into the code memory (19);

10 - the signal transmitter transmits a code signal according to the transmission code, and the signal receiver selectively detects a code according to the reception code; and

- the pulse controller (23) switches the device to identification mode upon detection of a code according to the reception code.

15

7. A device according to claim 5, **characterized** in that the code memory also includes codes operating in accordance with claim 6, and that the pulse controller is programmed to operate accordingly.

20

8. A device according to one of the claims 1 - 7, **characterized** in that all the operations of the device are programmed to the signal processor; besides the processor, the device only comprises a housing, a power source and amplifiers and an antenna for signal transmission and reception, a sensor or an emitter/radiator, and a detector.

30

9. A device according to one of the claims 1 - 8, **characterized** in that the signal given by the signalling unit (32) is mechanical vibration on the skin, a sound signal, a light signal, slight electric shocks on the skin, or a scent signal made by a small scent charge.

35

10. A device according to one of the claims 1 - 9, **characterized** in that the device is installed to a piece of jewellery hanging around the neck, a tie, clothes touching the skin, a watch or the like worn around the wrist, a band wrapped around

an arm or a leg, buttons or badges to be fastened to clothes, a pen or the like to be held in a pocket, a belt, a heel of a shoe, headgear, hair-dresses, a pocket phone, spectacle frames, a hearing aid, a ring or an earring.

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Fig. 1

Fig. 2a

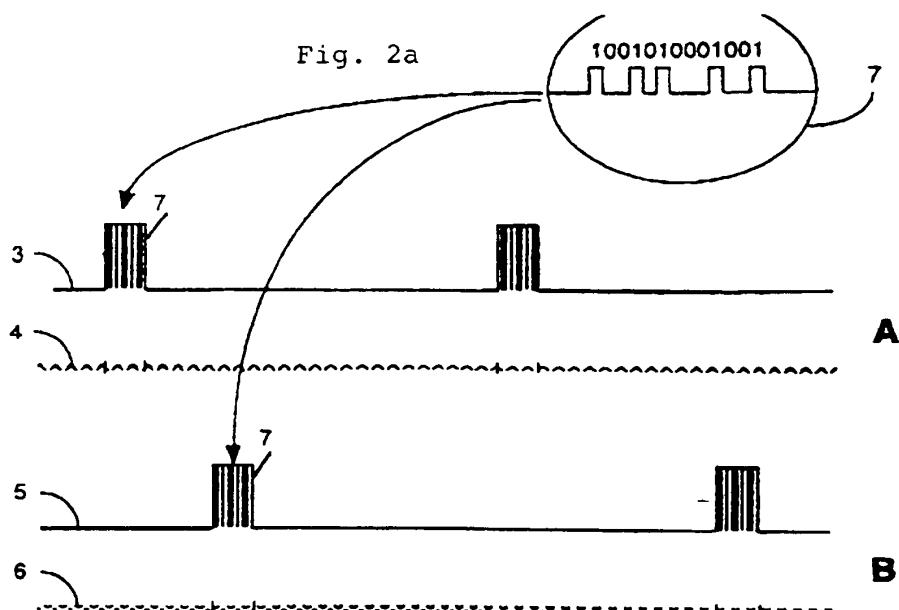


Fig. 2b

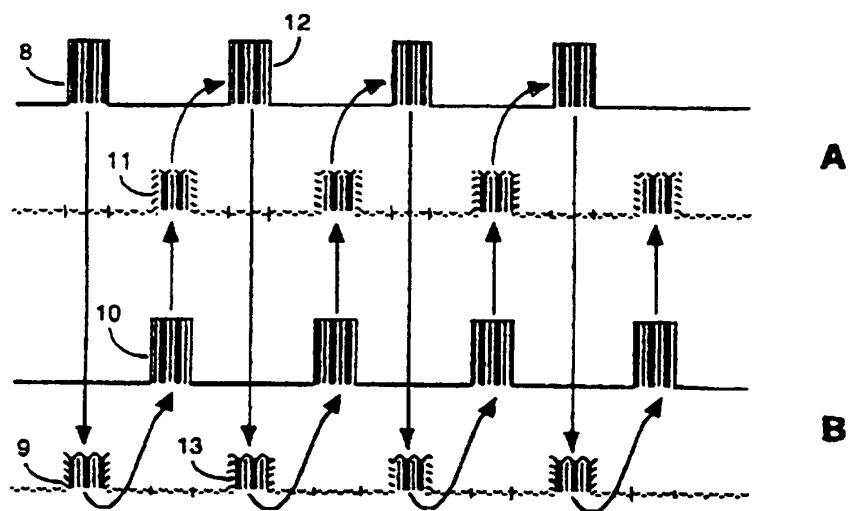


Fig. 2c

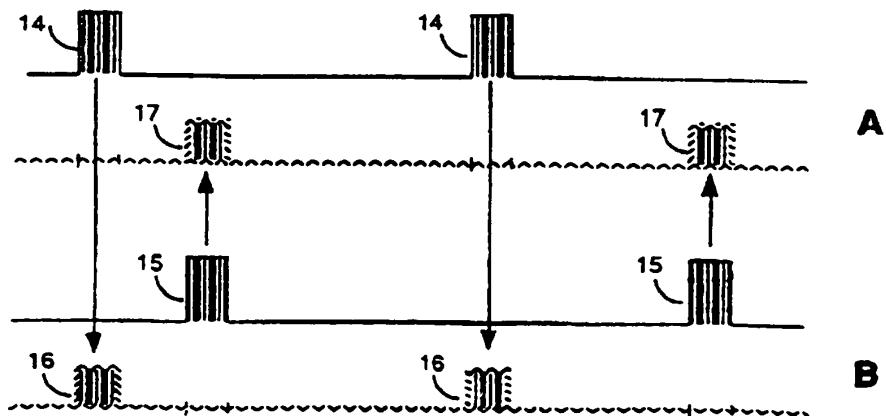


Fig. 2

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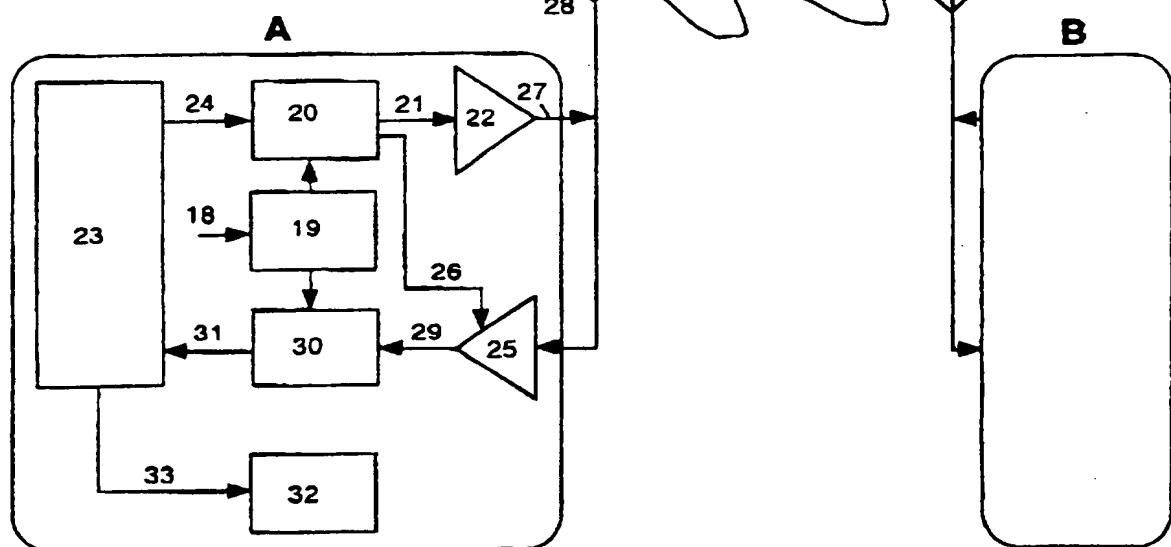
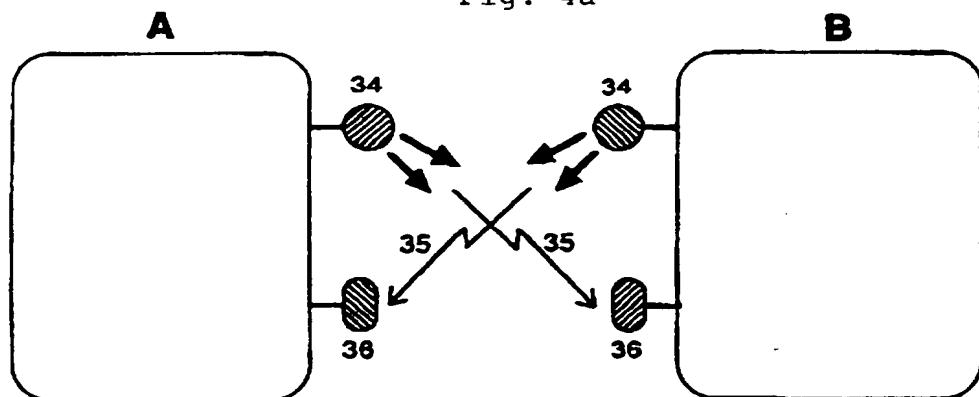


Fig. 3

Fig. 4a



A

B

Fig. 4b

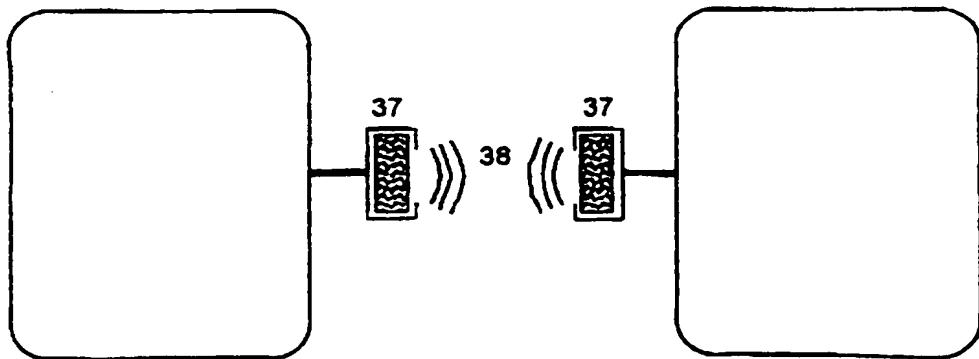


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 97/00001

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: G01S 13/74

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4173016 A (DICKSON), 30 October 1979 (30.10.79), see the whole document.	1-4,6,8-10
Y	--	5,7
Y	FR 2615957 A1 (DUPUCH), 5 March 1987 (05.03.87), page 2, line 1 - line 15, abstract	5,7
A	--	
A	US 5086394 A (SHMUEL SHAPIRA), 4 February 1992 (04.02.92), figure 1, abstract	1-10
A	--	
A	WO 8501583 A1 (FINDIT A/S), 11 April 1985 (11.04.85), abstract	1-10
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INTERNATIONAL SEARCH REPORT
Information on patent family members

04/03/97

International application No. PCT/FI 97/00001	
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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US 4173016 A	30/10/79	NONE		
FR 2615957 A1	05/03/87	NONE		
US 5086394 A	04/02/92	AU 5739190 A 29/11/90 JP 4507158 T 10/12/92 WO 9013828 A 15/11/90		
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